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Cardiac Fusion Imaging With Low-Dose Computed Tomography Using Prospective Electrocardiogram Gating

Lars Husmann, MD, Ines Valenta, MD,* Klaus Weber, MD,† Olivier Adda, MD,‡ Patrick Veit-Haibach, MD,* Oliver Gaemperli, MD,* and Philipp A. Kaufmann, MD*§*

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From the *Cardiovascular Center; University Hospital Zurich, Switzerland; †Heart-Center Bodensee, Switzerland; ‡GE Healthcare, France; and §Zurich Center for Integrative Human Physiology (ZIHP), University of Zurich, Switzerland.

Reprints: Philipp A. Kaufmann, MD, Cardiovascular Center, University Hospital Zurich, Raemistrasse 100, CH-8091 Zurich, Switzerland. E-mail: pak@usz.ch.

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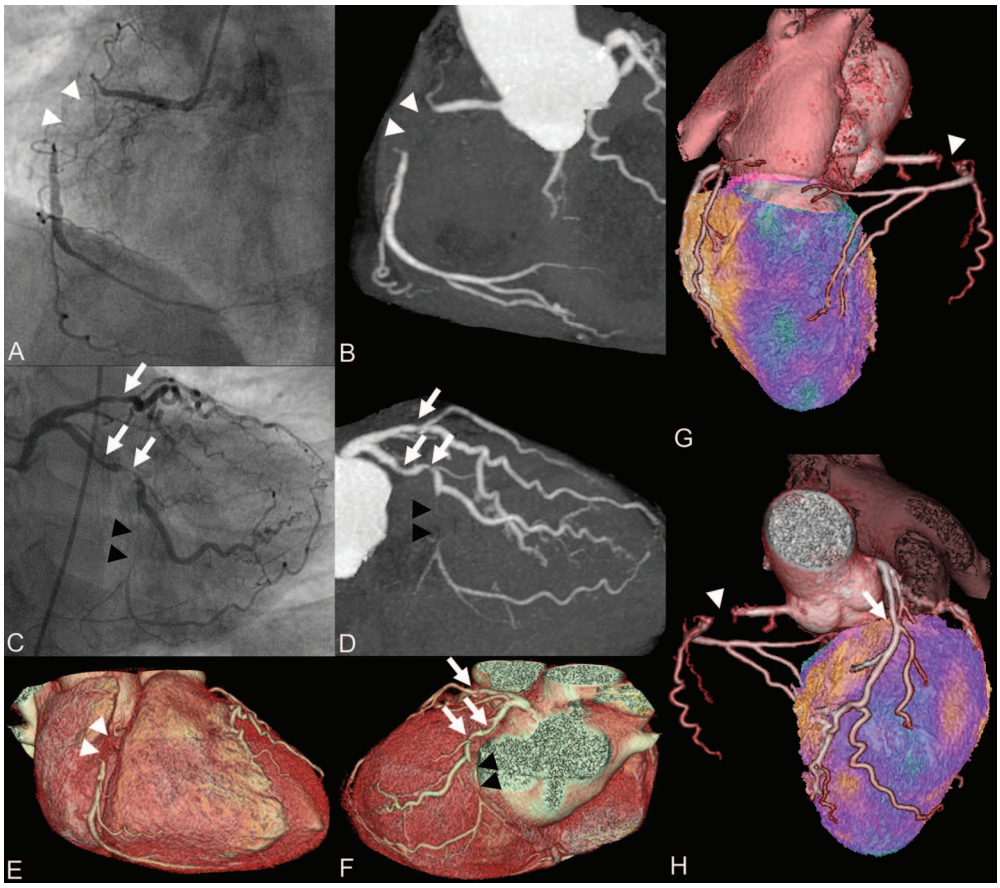

FIGURE 1. Images **A-H** reveal total occlusions of the right coronary artery (white arrowheads) and the distal circumflex artery (black arrowheads) with retrograde filling of the vessels (**A** and **C**: catheter angiography, **B** and **D**: computed tomography coronary angiography (CTCA) maximum intensity projections, **E** and **F**: volume rendered CTCA, **G** and **H**: fused positron emission tomography, PET/CTCA images). Additionally, 2 sequential significant stenoses are demonstrated proximal to the total occlusion in the circumflex artery and 1 significant stenosis is documented in the proximal left anterior descending artery (white arrows). Noninvasive assessment of viability was performed by F-18 FDG PET (Advance, GE Healthcare) and fused with a CTCA to identify culprit lesions with their respective territory as previously reported.[1–3] CTCA was performed with a LightSpeed VCT XT scanner (GE Healthcare) using prospective gating with "SnapShot Pulse" technology[4,5]; the smallest x-ray window was chosen (only 75% of the RR-cycle); tube current was 550 mA; tube voltage was 100 kV. The patient had a mean heart rate of 54 bpm, her body mass index was 25.6 kg/m^2; the applied radiation dose of CTCA was 1.2 mSv (as estimated from the dose length product: 71.6 mGycm). Fused PET/CTCA images (**G** and **H**) demonstrated a large scar in the inferior myocardium, corresponding to the total occlusion in the right coronary artery, and infarcted scar tissue with partially preserved viability in the anterior myocardium, corresponding to the presumably recanalized lesion in the left anterior descending artery. The lateral myocardium was viable, despite the total occlusion in the distal circumflex artery, most probably due to collaterals, which lead to retrograde filling of the vessel.

CTCA has been demonstrated to reliably detect coronary artery disease,[6,7] but radiation exposure has remained an issue of discussion.[8] First experience indicates that low-dose CTCA with "SnapShot Pulse" technology is feasible with good image quality and accurate findings. Because of its low dose, it seems particularly useful for cardiac hybrid imaging in conjunction with nuclear cardiac scanning.